

ABSTRACT OF THE DISCLOSURE

An Improved metrology apparatus, such as a scanning probe microscope (SPM), has an actuator that controls motion in three orthogonal directions when it is selectively and electrically stimulated. The X-Y section of the actuator, preferably a piezoelectric actuator, controls motion in the X and Y directions and the Z section of the actuator controls motion in the Z direction. A flexure is attached to the actuator and is mounted on a reference structure to prevent unwanted X and Y motion by the Z section of the actuator from moving a probe attached to the flexure. Preferably, two mirrors are mounted on the flexure. In operation of the SPM, a light beam is directed towards these mirrors. When the flexure moves in the Z direction, one of the mirrors is deflected and causes the reflected light to move across a detector, generating a signal representative of a change in the Z position of the flexure and the probe.